East Tester®

ET44 Series Benchtop digital bridge.



Contents

1 Installation

This chapter describes some checks that must be made when you receive the instrument and the conditions that you must learn and be equipped with before installing the instrument.

1.1 Out of Box Check

Thank you for purchasing and using our products. Before using this instrument, please confirm the contents of the last chapter "Warranty". In case of any non-conformity, please contact us as soon as possible to safeguard your interests. Make sure that the following items are attached to the bridge, where the optional accessories are included with the product only when ordered. If any items are missing, please contact your nearest sales office.

Standard Accessories:

- ●Four-terminal-pair Kelvin test cable (35A51).
- ● Three-core power cord (30A51).
- ● One User Manual.

Optional accessories:

- ●RS232 serial cable / USB data cable.
- ●Handle cable.
- ●Four-terminal-pair Kelvin test fixture (including short block)
- ●SMD component test fixture (including short block)

1.2 Power connection

(1) Power supply voltage range: 220V AC ± 10%, or 110V AC ± 10%.

(2) Power supply frequency range: 45-65Hz.

(3) Phase line L, zero line N, and ground line E of power input shall be the same as those of the power plug of this instrument.

(4) The instrument has been carefully designed to reduce the clutter interference caused by the input at the AC power supply terminal. However, it shall be used in a low noise environment. If such is not the case, please install the power supply filter.

WARNING: In order to prevent leakage from causing damage to the instrument or person, the user must ensure that the ground line of the power supply is reliably connected to the earth.

1.3 Fuses

The instrument has been provided with fuses in delivery; the user shall use the fuses provided by the company.

1.4 Ambient Environment

(1) Please do not use it in the place subject to dust, vibration, direct sunlight and corrosive gas.

(2) The normal working temperature of this instrument is 0 ℃ ~ 40 ℃, and working humidity is from 15% to 85%; Therefore please use the instrument in this condition as far as possible to ensure the measurement accuracy.

(3) The instrument has been carefully designed to reduce the clutter interference caused by the input at the AC power supply terminal. If such is not the case, please install the power supply filter.

(4) If the instrument is not to be used for a long time, please put it in the original box or similar box and store it in the ventilated room with temperature of 0 ℃ ~ 40 ℃ and relative humidity of not more than 85% RH; The air in the room shall not contain harmful impurities

corrosive to measuring instrument, and direct sunlight shall be avoided.

(5) The instrument, especially the test leads connected to the DUT, shall be kept away from the strong electromagnetic field to avoid interference to the measurement.

1.5 Test Fixture Used

Please use the test fixture or test cable provided by our company; the test fixture or test cable made by the user or other companies may lead to incorrect measurement results. The test fixture or test of the instrument cable shall be kept clean and the pins of the tested device shall be kept clean to ensure that the device under test is in good contact with the fixture.

The test fixture or test cable shall be connected to such four test terminals as Hforce, Hsense, Lsense and Lforce on the Front Panel of the instrument. For the device under test with a shielded enclosure, the shielding layer can be connected to the ground line of the instrument.

NOTE: When there is no Installation of test fixture or test cable, the instrument will display an unstable measurement result.

1.6 Warm-up and Continuous Working Hours

(1) In order to ensure accurate measurement of the instrument, the warm-up time shall be no less than 30 minutes after the instrument is turned on; the continuous working hours shall be less than 16 hours.

(2) Please do not switch the instrument frequently, which, otherwise, will cause the confusion of internal data.

1.7 Other Characteristics of the Instrument

(1) Power consumption: less than 20W.

(2) Dimensions: 265mm * 105mm * 305mm (W *H*L).

2 Description

ET44 series desktop bridge incorporates 3.5-inch TFT display, user-friendly interface, and a variety of measurement parameters into one body. It is convenient for users to carry out remote control with USB and RS232 and also perform the sorting of components using handle. In function, it can not only adjust the output frequency and test level, but also record the value of components in the process of measurement. In the performance parameters, its basic accuracy reaches 0.2%. This manual will take ET4410 as an example.

- Measurement frequency up to 100kHz
- Test level 100 ~ 2000mV
- Support the measurement of DC resistance and electrolytic capacitor
- Internal bias voltage output (1mV-1500mV)
- Automatic identification of component measurement
- 3.5-inch TFT display, 5 and a half bits display
- Support SCPI communication protocol
- Provide system settings, which can configure language, buzzer, screen brightness, etc according to the needs of users.
- Basic accuracy 0.2%
- Manual and automatic range
- Be equipped with open circuit and short circuit correction
- Comparator has sorting and alarm function
- Provide a variety of test ports

●USB, RS232 communication interface, Handle sorting

● Data recording function (maximum and minimum values, average value)

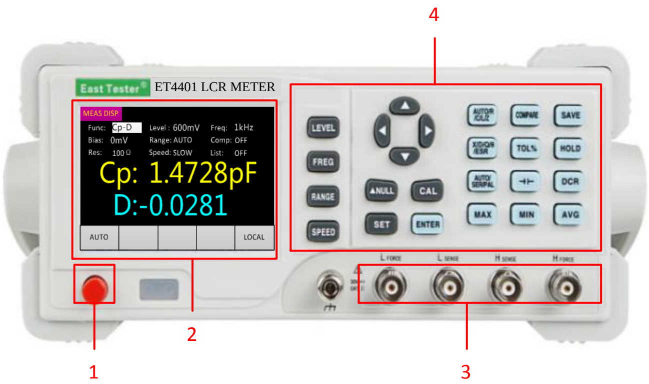
Model	**ET4401**	**ET4402**	**ET4410**
Digits	Main parameter: 5 digits; secondary parameter: 5 digits		
Measurement Parameter	Main parameter: L/C/R/Z; secondary parameter: X/D/Q/θ/ESR		
Measurement Range(L)	0.01μH - 9999H		
Measurement Range(C)	0.01pF - 99999μF		
Measurement Range(R)	0.0001Ω - 99.99MΩ		
Basic Accuracy	0.2%		
Test Frequency (Hz)	100~10kHz 10 point	100~20kHz 12point	100~100kHz 20 point
Measurement Display Speed	2 times/second (slow), 4 times/second (medium speed), 8 times/sec (fast)		
Internal Bias	0-1500mV adjustable, 1mV stepping		
Test Level	100mV、300mV、600mV、1000mV、1500mV、2000mV		
Correction Function	Open circuit correction, short circuit correction		
Screening function	The screening limit can be set from -50% to + 50% with fixed points of 1%, 5%, 10% and 20%		
Selection of comparator	Five gear sorting, third gear qualified, one gear failed, one ancillary gear		
Communication Interface	Standard configuration: USB, RS232 (or 485), Handle interface; Optional: GPIB, USB Host		
Others	Support DCR, electrolytic capacitor measurement mode, adjustable backlight brightness, optional in English and Chinese		

2.1 General Technical Specifications

●Power supply voltage: 220V AC ± 10%, or 110V AC ± 10%, 45-65Hz
●Working environment: 0 ~ 40 ℃, relative humidity <80%.
●Storage environment: -10 ~ 50 ℃, relative humidity <80%.
●Dimensions: 265mm * 105mm * 305mm (width * height* depth).
●Mass: 2.3kg.
●Power consumption: <10W

3 Quick Reference

3.1 Front Panel



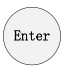
Het lek van elektuur:

Figure 3-1 Diagram of Front Panel

SN	Description
1	Power button
2	3.5 inch display.
3	Test clip jack
4	Basic Function Keys。

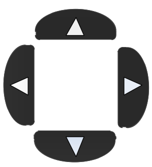
3.2 Introduction of Keys

3.2.1 Power On/Off Key



Power on/off key: After connected to the power supply, press down to turn on the instrument, pop up the key to turn off the instrument.

3.2.2 Direction Key



In the interface of measurement display, left and right keys control the cursor movement, and

up and down direction keys select parameters.

In the Interface of System Setting, up and down direction keys control the cursor movement, and left and right direction keys select parameters.

3.2.3 Basic Function Keys

LEVEL Quickly switch the level of fixed point.

FREG Quickly switch the frequency of fixed point.

RANGE Quickly switch the test range.

SPEED Quickly switch the test speed.

▲NULL Quickly switch between normal display and relative display.

SET Quickly switch between such two interfaces as "measurement display" and "system setting”.

CAL Press down to enter the open circuit and short circuit calibration modes, press down again to enter the calibration state; after the calibration is completed, press down again to exit the calibration mode and return to the normal mode.

ENTER Press down to make the measurement condition (bias, comparator setting) enter the input state and press down again to exit the input state.

AUTO/R /C/L/Z Quick switch the main parameter;

COMPARE Quickly switch Comparator Setting and Interface of Measurement Display;

SAVE Quickly save the currently set comparator parameters.(only valid in the interface of comparator).

X/D/Q/ θ /ESR Quickly switch secondary parameter.

TOL% Quickly set the tolerance value (only valid in the interface of comparator).

HOLD Turn on Data Retention Function.

AUTO /SER/PAL Quickly switch Equivalent Mode.

-|(- Quickly switch the mode of electrolytic capacitor.

DCR Quickly switch DCR DC resistance test function.

MAX Record the maximum value of the measurement in this period of time.

MIN Record the minimum value of the measurement in this period of time.

AVG Record the average value of the measurement in this period of time.

3.3 Introduction of Rear Panel

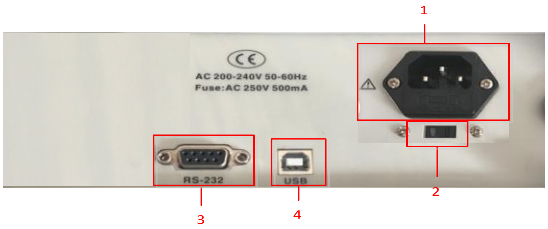


Fig.3-2 Rear Panel

SN	Description
1	Power jack: AC 220V / 50Hz power supply input socket.
2	Voltage selector: 110V / 60Hz VAC or 220V / 50Hz VAC.
3	RS232 INTERFACE.
4	USB Device interface.

3.4 User Interface

3.4.1 Interface of Measurement Display

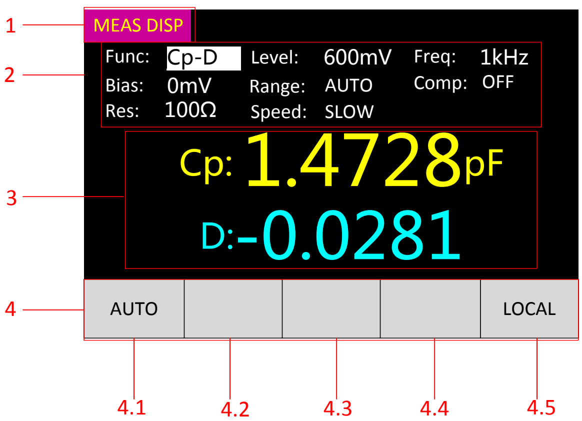


Fig.3-3 Interface of Measurement Display

1. Page title: It is used to identify the displayed page. There are three pages for measurement display/measurement setting/system setting respectively.
2. Measurement parameter setting
3. Main / secondary parameter display
4. Message column
   4.1 Data automation / retention.
   4.2 Relative display

4.3 MAX / MIN / AVG label display.

4.4 MAX / MIN / AVG value display.

4.5 Local mode/remote mode. Note: In the remote mode, the keyboard cannot be used; after entering the remote mode, it is required to manually send instructions back to the local mode (the default starting state of the instrument is the local mode).

3.4.2 Interface of Measurement Setting

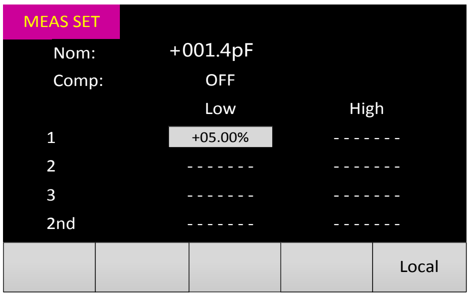


Fig.3-4 Interface of Measurement Display

3.4.3 Interface of List Scanning

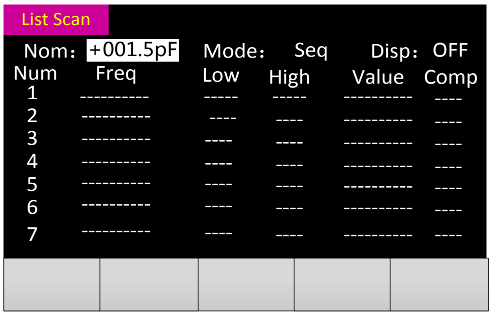


Fig.3-5 Interface of List Scanning

3.4.4 Interface of System Setting

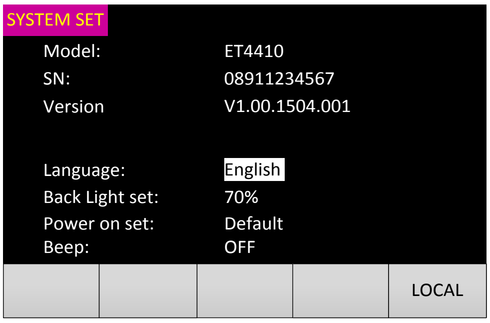


Fig.3-6 Interface of System Setting

4 Basic Function Operation

4.1 Startup & Shutdown

Connect the power cord, press down the power button, turn on the instrument, enter the

measurement interface (default); when the power button pops up, the instrument will be shut down.

4.2 Parameter Selection

4.2.1 Frequency Selection

Step one: Turn on the instrument to enter the interface of measurement display; the interface is as shown in Figure 4-1.

The second step: Switch the cursor to the frequency display area by using left and right direction keys, or switch to the next frequency point by pressing 

. (Commonly used frequency list: 100Hz, 120Hz, 200Hz, 400Hz, 800Hz, 1k, 2k, 4k, 8k, 10k, 15k, 20k, 40K, 50K, 80K, 100K)

The third step: Increase or decrease the frequency by pressing the up and down direction keys (the commonly used frequency list is as shown above). The interface is as shown in Figure 4-2.

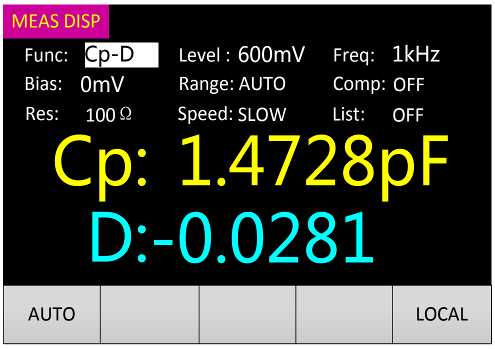


Fig.4-1

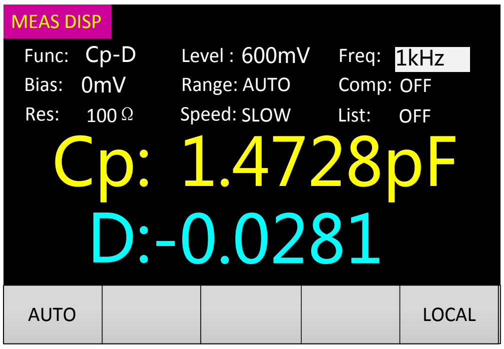


Fig.4-2

4.2.2 Level Selection

Step one: Turn on the instrument to enter the interface of measurement display; move the cursor to the level through the left and right direction keys.

The second step: Switch the cursor to the level display area by using left and right direction keys, or switch to the next test level by directly pressing 

. (Commonly used test level list: 100 mV, 300 mV, 600 mV, 1 V, 1.5 V, 2 V)

The third step: Increase or decrease the test level by using the up and down direction keys (the commonly used test levels are as shown above).

4.2.3 Offset Selection

Turn on the instrument to enter the interface of measurement display, move the cursor to the bias through the left and right direction keys, press the 

key to enter the level automatic setting interface with the interface as shown in Fig.4-3.

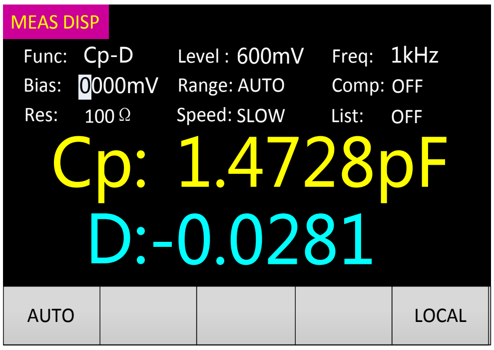


Fig.4-3

The offset value in the display interface is the current offset value (for example, if the offset value before the selection is 1V, then the level in the interface will be 1000mV). you can select the digit bit required to be changed through the left and right direction keys; the selected digit will be displayed in the inverted manner; the value of such digit can be changed through the up and down direction keys (the up direction key means + with the value of + 1; the down direction key means – with the value of - 1;). After the selection is completed, press the button ENTER to enter.

4.2.4 Range Selection

Method one:

Turn on the instrument to enter the interface of measurement display, move the cursor to the measurement range area and switch the range through the up and down direction keys (AUTO, 30Ω, 100Ω, 300Ω, 1kΩ, 3kΩ, 10kΩ, 30kΩ, 100kΩ).

Method two:

Press the RANGE key to directly switch to the next range, and the cursor moves to the range area.

4.2.5 Output Impedance Selection

The internal resistance is the Output Impedance of the test signal source. This instrument offers two internal resistance options: 30Ω and 100Ω. Enter the Interface of Measurement Display, move the cursor to the impedance through the left and right direction keys and switch the Output Impedance (30Ω, 100Ω) through the up and down direction keys. In the default state, Output Impedance is 100Ω. (Note: For non-current sensitive, especially low-impedance test pieces, 30Ω source resistance is recommended.)

4.2.6 Measurement Display Speed Selection

Method one:

Turn on the instrument to enter the interface of measurement display, move the cursor to the measurement range area and switch the speed through the up and down direction keys (fast, medium speed, slow).

Method two:

Turn on the instrument to enter the interface of measurement display, press the SPEED key to

directly switch to the next measurement speed (fast, medium speed, slow).

4.2.7 Main Parameter Selection

Turn on the instrument to enter the interface of measurement display, press the AUTO/R /C/L/Z key to switch to the next main parameter (AUTO, R, C, L, Z). When the Main Parameter is selected AUTO, the function area will be displayed the word "AUTO".

4.2.8 Secondary Parameter Selection

Turn on the instrument to enter the interface of measurement display, press the X/D/Q/ θ /ESR key to switch to the next secondary parameter (X, D, Q, θ, ESR).

4.2.9 Equivalent Mode Selection

Press the AUTO /SER/PAL key to switch to the next equivalent mode (AUTO, SER, and PAL).

4.2.10 Comparator Setting

(1) Nominal value selection

Step one: Turn on the instrument to enter the interface of measurement display, the instrument test clip shall be placed with the component with the similar desired nominal value.

Step two: Press the COMPARE key to open the Interface of Measurement Setting. At this time, the position of the cursor is at the nominal value in default. The nominal value is the value of the component under test, and the nominal value shall reserve one digit after decimal point, but the unit shall not be less than the minimum unit (For example, if the measured value of component is 1.0694kΩ, then nominal value shall be 1.1kΩ; for another example, if the measured value of component is 330.92Ω, then nominal value shall be 330.9Ω).

If at this time the nominal value is not desired one, move the cursor to the nominal position through the left and right direction keys and press the ENTER key to enter the nominal value modification interface. The interface is as shown in Fig.4-4. Note: Each time entering the Interface of Measurement Setting, the nominal value will be automatically updated based on the current measurement.

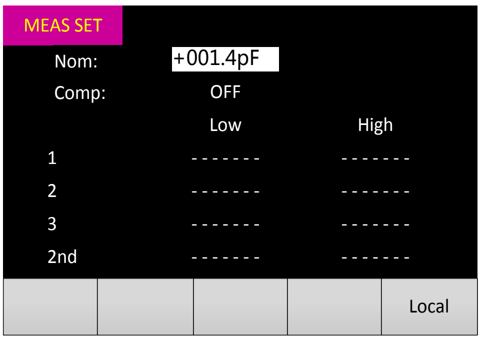


Fig.4-4

(2) Comparator switch

Method one:

In the Interface of Measurement Display, move the cursor to the comparator through the left and right direction keys , and then turn on / off the comparator through the up and down direction keys.

Method Two:

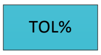
In the Comparator Setting interface, move the cursor to the comparator via the up and down direction keys, and turn on / off the comparator through the left and right direction keys.

(3) Tolerance Selection

Method one:

Step 1: Turn on the instrument to enter the interface of measurement display, press the 

key to enter the Interface of Measurement Setting with the interface as shown in Fig.4-5.

Step 2: Use the direction key to move the cursor to the upper and lower limits of the set gear and press the 

key to switch to the next tolerance value (1%, 5%, 10%, 20%) as shown in Fig.4-6

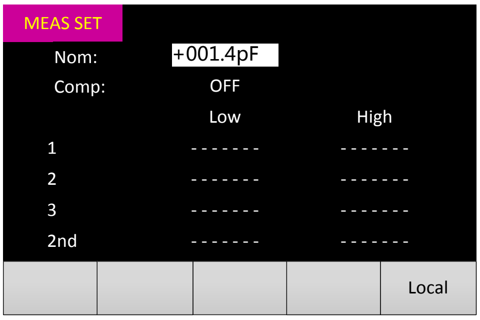


Fig.4-5

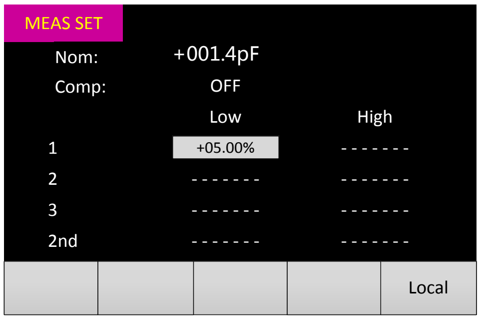


Fig.4-6

Method Two:

Step one: the same as method one

Step two: move the cursor to the tolerance through the left and right direction keys, short press the 

key to enter the custom tolerance interface (-50.00% ~ +50%, resolution 0.01%). The setting method can refer to the custom setting of frequency.

(4) Sorting mechanism

P1, P2 and P3 are used to indicate whether the main parameter is qualified or not. If it is not qualified, then OUT flag will be displayed on the Interface of Measurement Display (in the case of turning on the comparator); then the sorting is completed. If it is qualified, P1~P3 will be displayed 1/2/3 in the measurement display, and continue to execute secondary parameter comparison. If the secondary parameter is set, and the secondary parameter is not in the range, it will be displayed AUX.

AUX is used to indicate whether the secondary parameter is qualified or not. If the primary parameter is qualified, then unqualified secondary parameter will be displayed on the AUX display.

If one of the main parameter and secondary parameter of NG is not qualified, it will be displayed OUT as shown in Fig.4-7

The comparison process is as shown in Fig.4-8:

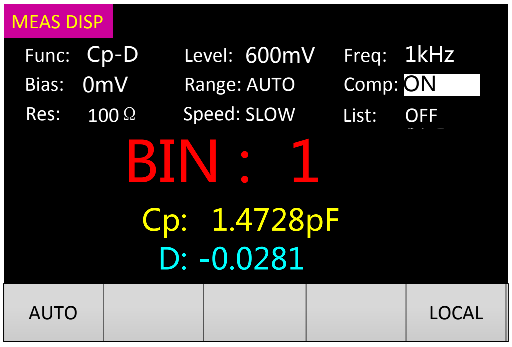


Fig.4-7

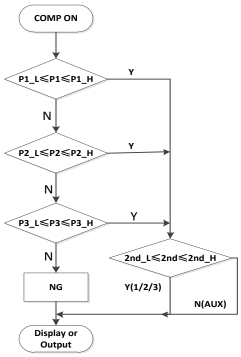
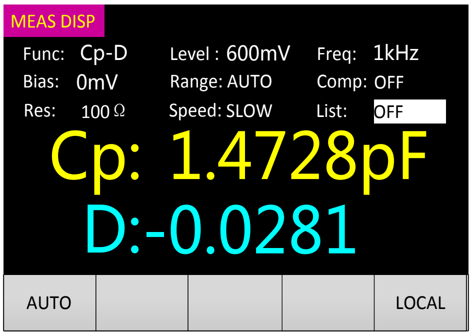


Fig.4-8

Note: If you want to save the currently set tolerance value, press the SAVE key to save. After saving, the data set will not be lost after shutdown.

4.2.11 List Scanning Function

Turn on the instrument to enter the interface of measurement display, move the cursor to the list switch through the left and right direction keys, and enter Interface of List Scanning by means of switching the up and down switch Keys as shown in Fig.4-9 and 4-10. The List Scanning Function can carry out circulated scanning over seven groups of frequencies and compare them with the nominal values to get the comparison results. The scanning mode is divided into stepping scanning and sequential scanning. Set the frequency and upper and lower limits, and then open the scan display, you can get the measured value and comparison results. Comparison result "H": greater than upper limit, "L": less than lower limit, "I": within the range between them.



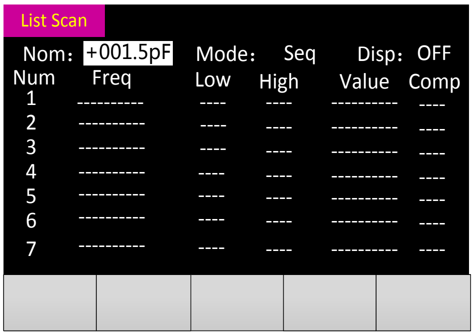


Fig.4-9 Fig.4-10

4.2.12 DCR MODE

Press DCR to enter DCR DC resistance measurement mode. The interface is as shown in Fig.4-11.

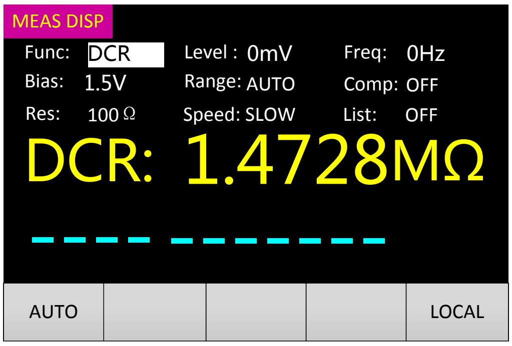


Fig.4-11

4.2.13 Electrolytic Capacitor Mode

Press -|(- to enter Electrolytic Capacitor Mode. The interface is as shown in Fig.4-12.

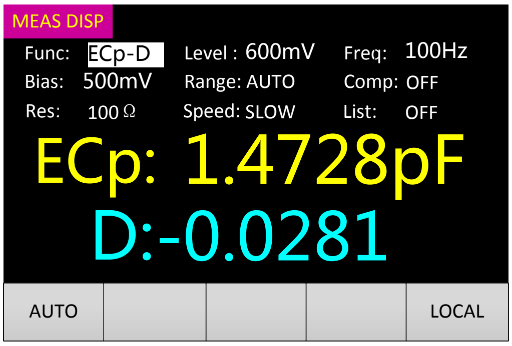


Fig.4-12

4.2.14 Relative Function

Short press the ▲NULL key to open and take the current value as the reference value, secondary parameter will display the reference value and Main parameter will display the relative value; the interface is as shown in Fig.4-13.

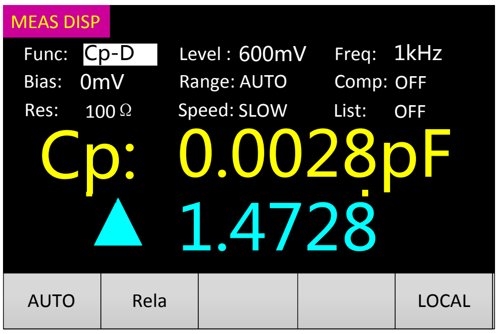


Fig.4-13

4.2.15 Data Retention Function

Press the HOLD key to open the Data Retention Function; press the HOLD key again to turn off the function. The interface is as shown in Fig.4-14

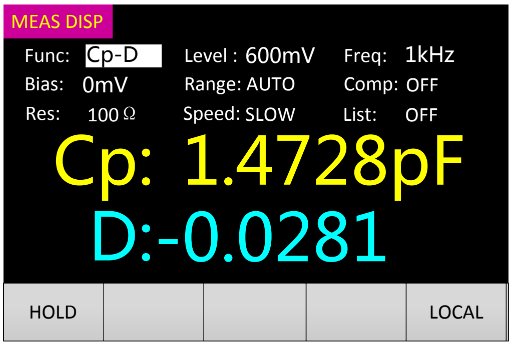


Fig.4-15

4.2.16 Data Recording Function (Maximum Value, Minimum Value, Average Value)

Press the MAX key/ MIN key / AVG key to toggle the selection to display the maximum, minimum, and average values. The key pressing cycle is 2 times per cycle. For example,Press MAX key the first time to display the maximum value, press the second to exit the record maximum mode. The interface is as shown in Fig.4-16.

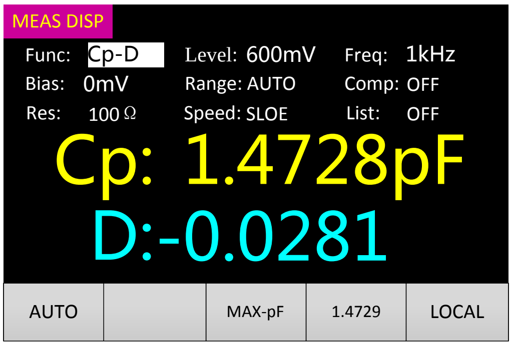
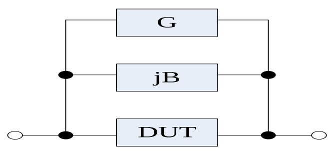
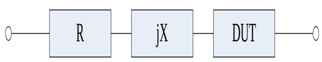


Fig.4-16

4.2.17 Correction Function

Correction Function	Description	Typical Use	Model
Open circuit correction	Compensate for the stray admittance caused by the test fixture	High impedance measurement	
Short circuit correction	Compensate for the residual impedance caused by the test fixture	Low impedance measurement	
Open/short circuit	Compensate for the stray admittance and	Precision measurement	----

correction	residual impedance caused by the test fixture		

Step 1: Press the [- CAL] key to enter the correction interface. The interface is as shown in Fig.4-17. If you do not want to perform correction, press the Main parameter function key [AUTO/R /C/L/Z] to exit. In this mode, only the [- CAL] key and the Main parameter function key [AUTO/R /C/L/Z] are valid. (Open circuit: OPEN, short circuit, SHORT, neither: ERROR). Connect the test fixture to the gold plated short circuit board (short circuit) or disconnect the outside of the fixture (open circuit).

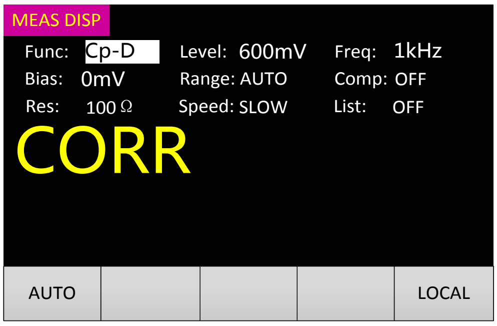
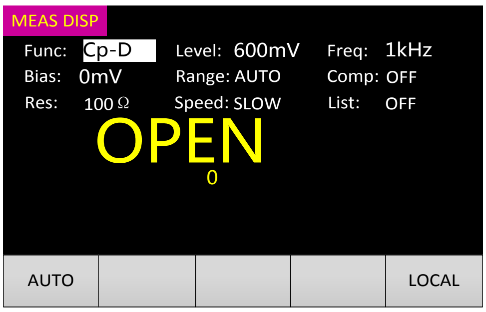


Fig.4-17

Step 2: Press the [- CAL] key to carry out open or short circuit correction (automatic identification of open circuit, short circuit, open circuit OPEN, short circuit SHORT) with the interface as shown in Fig.4-18 (the number will be added 1 along with the correction progress,). If the correction is successful, the word "success" is displayed in the position where "Digital" is displayed. If it fails, "FAIL" will be displayed as shown in Fig.4-19; press the [- CAL] key again to return to Interface of Measurement Display.



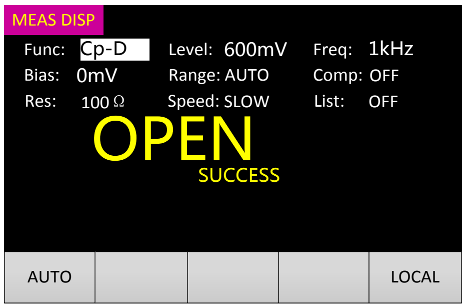


Fig.4-18 Fig.4-19

Step 1: Turn on the instrument to enter the interface of measurement display, and press the [SET] key to enter the Interface of System Setting.

Step 2: Move the cursor to "Brightness Adjustment" through the up and down direction keys, and switch the backlight brightness (30%, 50%, 70%, 100%) through the left and right direction keys.

4.2.18 Power-on Parameter Setting

Step 1: Turn on the instrument to enter the interface of measurement display, and press the 

key to enter the Interface of System Setting。

Step 2: Move the cursor to the "Power-on Setting " via the up and down direction keys, and then switch the "Power-on Setting " (default value, previous value) through the left and right direction keys.

4.2.19 Buzzer Switch Setting

Step 1: Turn on the instrument to enter the interface of measurement display, and press the 

key to enter the Interface of System Setting.

Step 2: Move the cursor to the "buzzer" via the left and right direction keys, and then switch the buzzer switch (ON and OFF) through the up and down direction keys.

The selection range for the system setting parameters is as shown in the table below.

System Language	Chinese, English
Brightness Adjustment	30%, 50%, 70%, 100%
Power-on Setting	Default value, previous value
Buzzer	OFF, ON

5 Basic Performance Indicators

5.1 Measurement Parameter

(1) Main parameter: L: inductance; C: capacitance; R: resistance; Z: impedance.

(2) Secondary parameter: X: reactance; D: loss; Q: quality factor; θ: impedance angle ESR: series equivalent resistance.

(3) Measurement Parameter combination: the combination of main parameter and any secondary parameter

5.2 Equivalent Mode

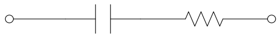
SER: series connection; PAR: parallel connection.

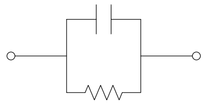
The actual inductance, capacitance and resistance are not the ideal pure reactance or resistance elements, but the complex impedance elements in series or parallel form; this instrument calculates the required value according to the series or parallel equivalent circuit with different equivalent circuit obtaining different results. The two equivalent circuits can be converted through the formula listed in the table Equivalent Circuit Conversion. Q and D are the same regardless of what equivalent mode.

Series/parallel Circuit Model

The circuit models and formulas of the six series and parallel equivalent circuits are described below: capacitance, inductance and resistance. The formula contains all the types of first measurement and second measurement.

Capacitance(C) Schematic Diagram of Series Connection Schematic Diagram of Parallel Connection

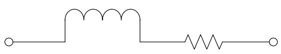


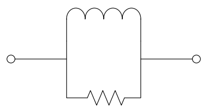


Series Connection Formula Parallel Connection Formula

$$Cs=Cp(1+D^2) \qquad Cp=\frac{Cs}{(1+D^2)}$$

Inductance (L) Schematic Diagram of Series Connection Schematic Diagram of Parallel Connection

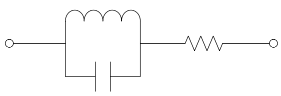


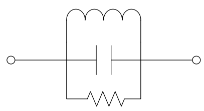


Series Connection Formula Parallel Connection Formula

$$Ls=\frac{Lp}{(1+\frac{1}{Q^2})} \qquad Lp=Ls(1+\frac{1}{Q^2})$$

Resistance(R) Schematic Diagram of Series Connection Schematic Diagram of Parallel Connection





Series Connection Formula Parallel Connection Formula

$$Rs=\frac{Rp}{(1+Q^2)} \qquad Rp=Rs(1+Q^2)$$

Note: In the component parameters, the subscript s represents the series connection equivalent, and p represents the parallel connection equivalent. In general, the series equivalent circuit shall be used for low-value impedance elements (basically high-value capacitance and low-value inductance); on the contrary, the parallel equivalent circuit shall be used for high-value impedance elements (basically low-value capacitance and high-value inductance). Meanwhile, it is advisable to determine the equivalent circuit according to the actual use of the components; for example, when the capacitor is used for power supply filter, the series equivalent circuit shall be used, while, when the capacitor is used for LC oscillation circuit, the parallel equivalent circuit shall be used.

5.3 Basic Accuracy

The following data shall be measured under the following conditions:

- Temperature condition: 23℃±5℃
- Humidity condition: ≤65% R.H.
- Zero value adjustment : open circuit and short circuit zeroed before the test
- Warm-up time:> 30 minutes
- Calibration time: 12 months

C: 0.20%*(1+ Cx/Cmax+ Cmin/Cx)(1+Dx)(1+ks+kv+kf);

L: 0.20%*(1+ Lx/Lmax+ Lmin/Lx)(1+1/Qx)(1+ks+kv+kf);

Z: 0.20%*(1+ Zx/Zmax+ Zmin/Zx)(1+ks+kv+kf);

R: 0.20%*(1+ Rx/Rmax+ Rmin/Rx)(1+Qx)(1+ks+kv+kf);

D: 0.20%*(1+ Zx/Zmax+ Zmin/Zx)(1+Dx+Dx*Dx)(1+ks+kv+kf);

Q: 0.20%*(1+ Zx/Zmax+ Zmin/Zx)(Qx+1/Qx)(1+ks+kv+kf);

Wherein

1. L, C, R, Z are relative errors; D, Q, θ are absolute errors
2. Where the subscript is x, it is the measurement of this parameter; where the subscript is max, it is the maximum value and where the subscript is min, it is the minimum value
3. Ks is the velocity factor, kv is the voltage factor, kf is the frequency factor

The maximum and minimum values of the measurement parameters that affect accuracy

Frequency(Hz)	100	120	200	400	800	1K	2K	4K	8K	10K
Cmax	800	667	400	200	100	80	40	20	10	8
Cmin	1500	1250	750	375	187	150	75	37.5	18.7	15
Lmax	1590	1325	795	397.5	198.8	159	79.5	39.8	19.9	15.9
Lmin	3.2	2.6	1.6	0.8	0.4	0.32	0.16	0..08	0.04	0.032
Z/Rmax	1									
Z/Rmin	1.59									

Frequency (Hz)	15K	20K	40K	50K	80K	100K
Cmax	5.3	4	2	1.6	1	0.8
Cmin	10	7.5	3.75	3	1.87	1.5
Lmax	10.6	7.95	3.98	3.18	1.99	1.59
Lmin	0.021	0.016	0.008	0.0064	0.004	0.0032
Z/Rmax	1					
Z/Rmin	1.59					

Wherein: the unit of Cmax is uF; the unit of Cmin is pF; the unit of Lmax is H; the unit of Lmin is mH; the unit of Zmax / Rmax is MΩ; the unit of Zmin / Rmin is in Ω;

Measurement speed error factor ks:

Speed Mode	Slow	Medium	Fast
ks	0	1	8

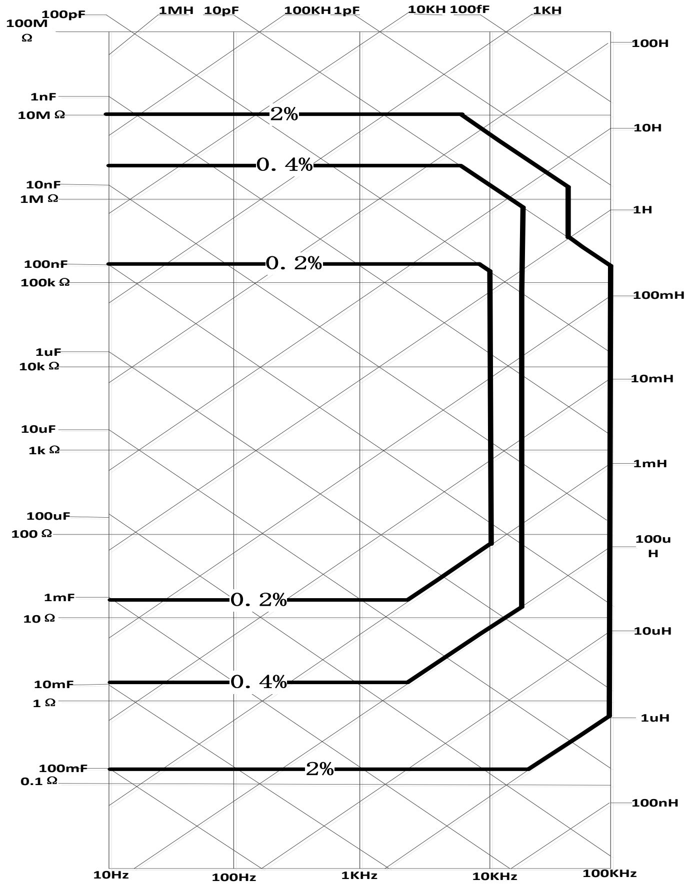
Measurement speed error factor kf:

Frequency	100~1K	2K~10K	15K	20K	40K	50K	80K	100K
kf	0	0.5	1		2		3	

Measurement speed error factor kv:

Level(mV)	100	300	600	1000	1500	2000
kv	10	3	1	0	1	2

1V test level, slow speed, the accuracy of Kelvin clamping measurement is as follows:



5.4 DCR MEASUREMENT ACCURACY

Range	Display Range	Accuracy Re
100MΩ	20.00MΩ~99.99MΩ	10.0%+20 words
20MΩ	10.00MΩ~20.00MΩ	5.0%+10 words
10MΩ	4.000MΩ~9.999MΩ	2.0%+5 words
4MΩ	400.0kΩ~3.9999MΩ	1.2%+3 words
400kΩ	40.00kΩ~399.99kΩ	0.3%+3 words
40kΩ	4.000kΩ~39.999kΩ	0.2%+2 words
4kΩ	400.0Ω~3.9999kΩ	0.2%+2 words
400Ω	40.00Ω~399.99Ω	0.2%+2 words
40Ω	4.000Ω~39.999Ω	0.3%+3 words
4Ω	0.400Ω~3.999Ω	1.0%+5 words
0.4Ω	0.000Ω~0.399Ω	3.0%+10 words

5.5 Test Signal Frequency

Frequency accuracy: 0.02%

5.6 Test Signal Level

Test Level Accuracy: 10%.

5.7 Output Impedance

Output Impedance Accuracy: 5%.

5.8 Measurement Display Range

Parameter		Display Range
L	100Hz~1KHz	1μH～9999H
	1KHz~10Khz	0.1μH～999.9H
	10KHz~100KhZ	0.01μH～99.99H
C	100Hz~1KHz	0.1pF～99.999mF
	1KHz~10Khz	0.1pF～1000μF
	10KHz~100KhZ	0.01pF～100μF
R/Z/X		0.0001Ω～99.99MΩ
D		0.0001～99999
Q		0.0001～99999
θ		-180.000deg～180.000deg
ESR		0.0001Ω～99.99MΩ

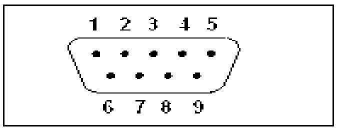
6 External Interface Instructions

6.1 USB INTERFACE

USB communication interface can realize online communication with the computer. (Communication protocol refers to SCPI part)

6.2 RS232 INTERFACE

The RS232 connector uses 9-pin DB socket with the pin sequence as shown below:



Pin definition: 2 pins: RXD (receive data), 3 pins: TXD (send data), 5 pins: GND (ground)

7 SCPI COMMAND REFERENCE

Omitted. (If necessary, please contact the manufacturer for it.)

8 Precautions and Warranty

8.1 Packaging

Measuring instruments shall be generally packaged in the dust-proof, vibration-proof and moisture-proof firm packaging box together with accessories, spare parts, instructions and product certification covered with plastic bags.

8.2 Transportation

Measuring instruments shall be carefully handled, moisture-proof and spray-proof in the process of transportation.

8.3 Storage

The measuring instrument shall be stored in a ventilated room with ambient temperature of 5°C to 40°C and relative humidity of 15% to 85%. The air shall not contain harmful impurities in corrosive to the instrument.

8.4 Warranty

This instrument shall be maintained and repaired by professional technical personnel; please do not arbitrarily replace various components within the instrument in maintenance; after the maintenance, a new measurement and calibration shall be carried out so as not to affect the test accuracy. The warranty range shall not include the damage to the instrument due to the user's blind maintenance and replacement of components, in which case the user shall bear the cost of maintenance.